



EPA Update & GreenChill Overview

NATIONAL HVACR EDUCATORS & TRAINERS CONFERENCE

HVACR Education for the 21st Century



The Ozone Layer

- Stratospheric ozone is a naturally-occurring gas that filters the sun's ultraviolet (UV) radiation
- Acts as a shield in the stratosphere
- Protects life on Earth from the sun's UV rays

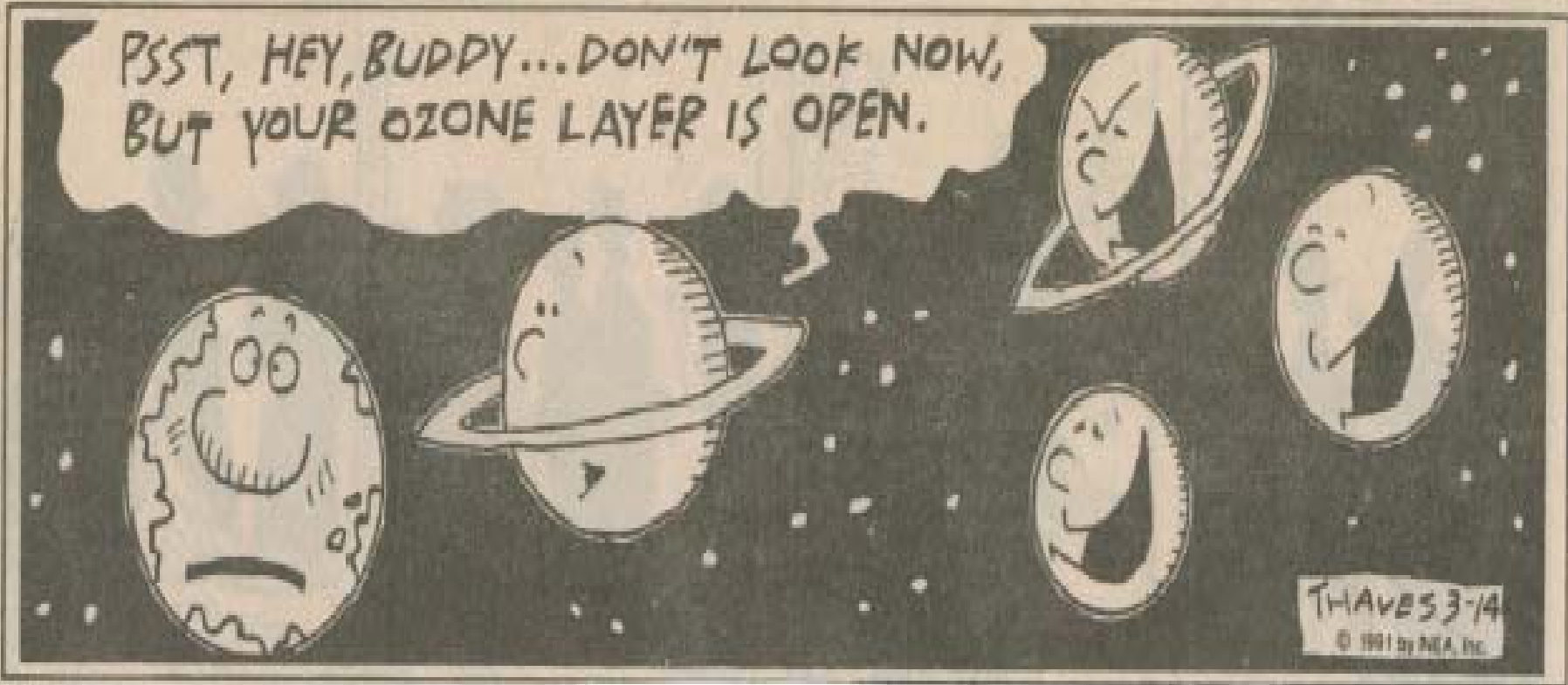


THE PROBLEM



FRANK & ERNEST BOB THAVES

PSST, HEY, BUDDY... DON'T LOOK NOW,
BUT YOUR OZONE LAYER IS OPEN.



Overexposure to the Sun



★ Skin Cancer

◆ Melanoma & Nonmelanoma

★ Premature aging of the skin and other skin problems

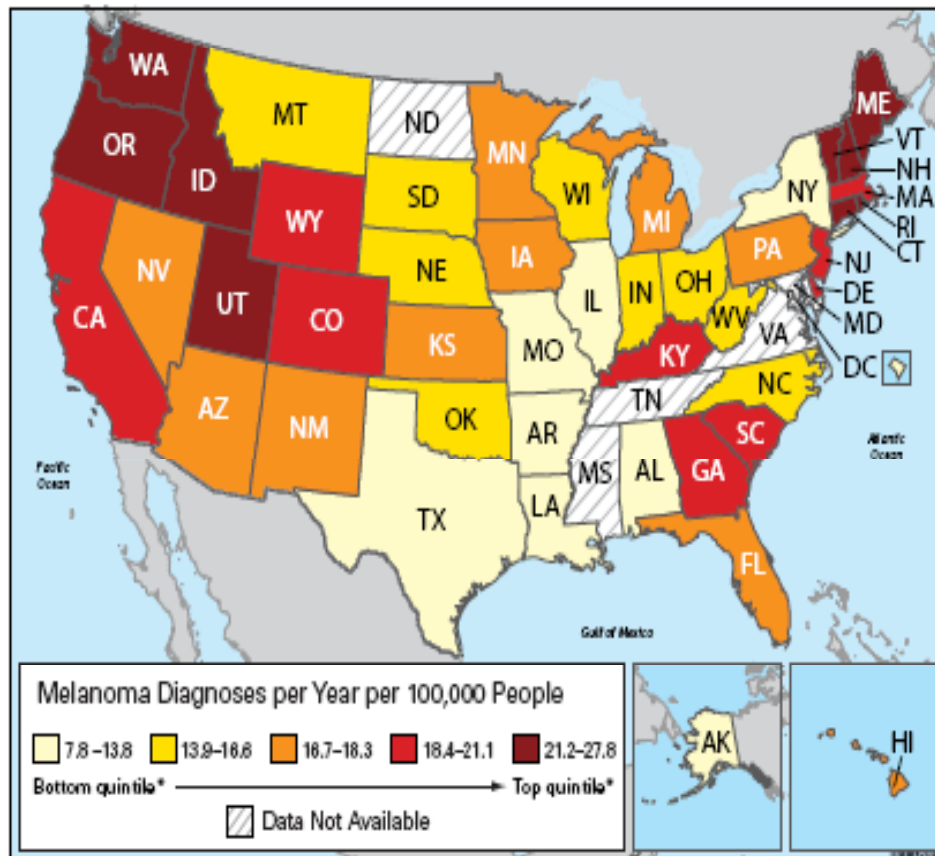
★ Cataracts

★ Immune System Suppression





National Annual Rate of New Melanoma Diagnoses, 2001–2004¹³ All Races, Both Sexes, All Ages



* States are grouped into quintiles based on rates of melanoma diagnoses. A quintile is a statistical "block" representing 20% of a total. Because data are available for only 45 states and D.C., four quintiles include nine states, and one includes 10. For example, the nine states with the highest melanoma rates—21.2 to 27.8 diagnoses per 100,000 residents every year—are in the top quintile.

- More than 1 million new skin cancer cases per year
- 1/2 of all cancers are skin cancers
- Melanoma incidence rates one of the few cancer rates increasing
- One person dies every hour

Climate Change



- Increasing Temperature
- Melting of Glaciers
- Thawing of Permafrost
- Lengthening of Growing Season
- Shifts in Plant and Animal Ranges
- Earlier Flowering of Plants and Trees



Twenty Questions and Answers About the Ozone Layer: 2010 Update

- Twenty Questions and Answers About the Ozone Layer: 2010 Update
- <http://tinyurl.com/twentyquestions>
- What is ozone and where is it in the atmosphere?
- Why do we care about atmospheric ozone?
- What are the principal steps in stratospheric ozone depletion caused by human activities?
- What emissions from human activities lead to ozone depletion?
- Has the Montreal Protocol been successful in reducing ozone-depleting substances in the atmosphere?
- Does depletion of the ozone layer increase ground-level ultraviolet radiation?
- Is depletion of the ozone layer the principal cause of climate change?
- Have reductions of ozone-depleting substances under the Montreal Protocol also protected Earth's climate?
- How is ozone expected to change in the coming decades?



THE SOLUTION

Ozone Layer Protection



- Montreal Protocol
 - International treaty, universal participation (196 countries)
 - purpose is to repair and protect the earth's ozone layer so we remain safe from the harmful effects of ultraviolet (UV) radiation
 - mandated the complete phaseout of CFCs
 - Gradual phaseout of HCFCs started in 2004 according to a schedule agreed upon by the signing parties, including the USA.
- The U.S. incorporated the Montreal Protocol requirements into [Title VI of the United States Clean Air Act](#)
 - [Title 40, Part 82](#) of the Code of Federal Regulations contains EPA's regulations to protect the ozone layer
 - EPA's [Stratospheric Protection Division](#) manages these programs
- Outstanding environmental and health benefits
 - millions of U.S. skin cancer deaths and cataract cases will be prevented

Climate Change



- Refrigerants are 1800-4000 times more potent global warmers than carbon dioxide
- By 2010, ozone layer protection will have done more to mitigate climate change than initial Kyoto Protocol reduction target
- Avoided 11 gigatons of CO₂ equivalent per year
- Delayed climate impacts by approximately 10 years



IMPLEMENTING THE SOLUTION

Then and Now: Progress in Ozone Protection

Polystyrene Cups and Packing Peanuts

Then: CFCs

Now: Materials that don't deplete the ozone layer

Computer Circuit Boards

Then: CFCs or methyl chloroform

Now: Water or HCFCs

Aerosol Cans

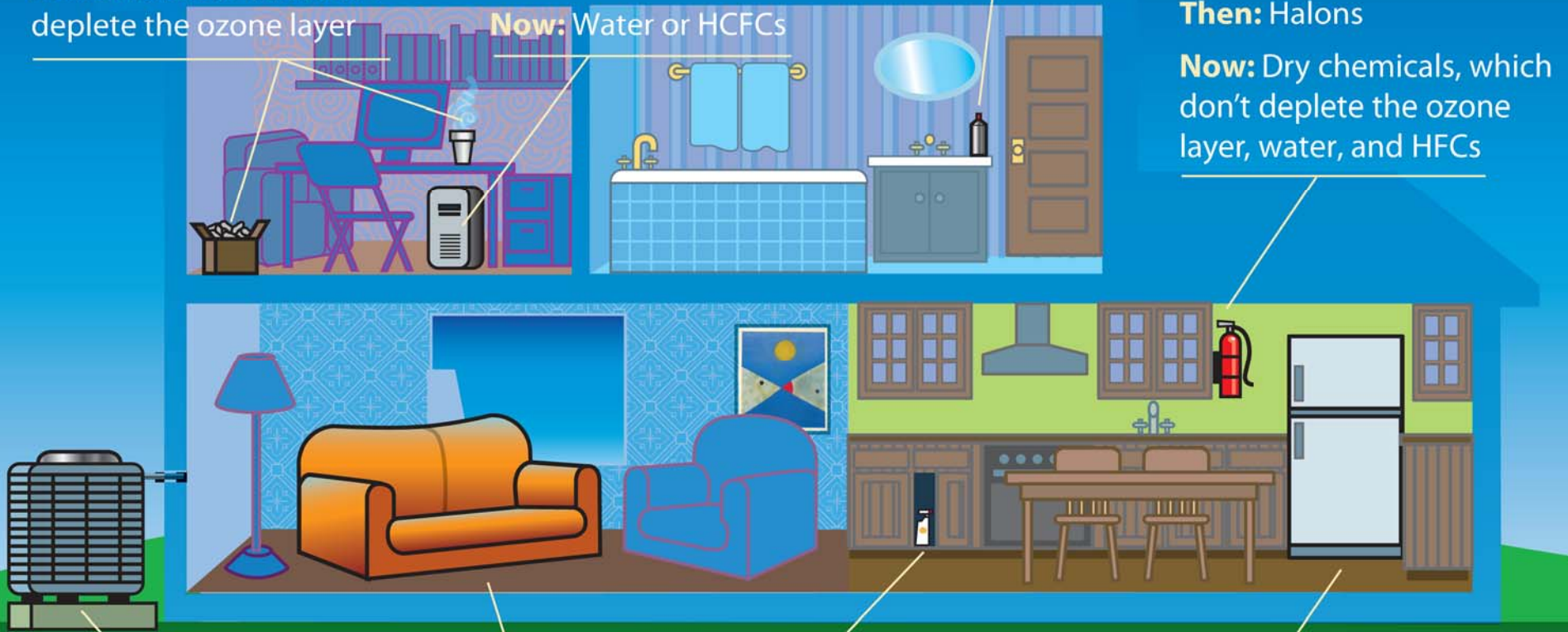
Then: CFCs

Now: Hydrocarbons

Fire Extinguishers

Then: Halons

Now: Dry chemicals, which don't deplete the ozone layer, water, and HFCs



Home and Car Air Conditioners

Then: CFCs

Now: HCFCs and HFCs

Furniture

Then: CFCs

Now: Water-blown foam

Degreasers

Then: CFCs or methyl chloroform

Now: Water-soluble compounds and hydrocarbon degreasers

Refrigerators

Then: CFCs

Now: HFCs

Phaseout of HCFC-22



- ▶ What does the phaseout of HCFCs mean for the availability of R-22?
 - ▶ **Newly produced R-22 will decline by half between 2010 – 2015**
 - ▶ **No R-22 or HCFC-142b may be produced in 2020**
 - ▶ **Increased recovery and reclamation/recycling is necessary to meet demand**

- ▶ What does the phaseout mean for existing refrigeration & A/C equipment?
 - ▶ **Existing equipment can continue to be serviced using R-22**
 - ▶ **EPA is not mandating the retrofit or replacement of existing R-22 equipment to HFC alternatives**

- ▶ What does the phaseout mean for expansions of existing refrigeration & A/C systems?
 - ▶ **An expansion is not “servicing”**
 - ▶ **Virgin R-22 cannot be used in new equipment (made after 1/1/2010)**

- ▶ What does the phaseout mean for new refrigeration & A/C equipment?
 - ▶ **Virgin R-22 cannot be used in new equipment (made after 1/1/2010)**

- ▶ <http://www.epa.gov/ozone/title6/phaseout/rulesoverview.html>

Clean Air Act TITLE VI



- “No Venting” for ODS & Substitutes
- Mandatory Servicing Requirements
Minimize Emissions
 - Leak Repair & Other Servicing Practices
- Refrigerant’s 3Rs:
 - ***Recovery, Recycling, & Reclamation***
 - Recover/recycle onsite for equipment with same ownership or send to reclaimer to clean to industry purity standards then resell
 - Safe disposal requirements for equipment at end-of-life

Clean Air Act TITLE VI



- Section 612 of CAA - SNAP
 - Directs EPA to evaluate alternatives
 - Find acceptable those that reduce overall risk to human health and the environment

- SNAP Has Listed ~400+ Substitutes for Specific End Uses
 - Hydrocarbons (R-441A, R-290, R-600a)
 - Proposed for Domestic Refrigerators and Retail Food Refrigeration (Stand-Alone Equipment Only)
 - Carbon Dioxide (CO₂ or R-744)
 - Supermarkets
 - HFO-1234yf and CO₂
 - Proposed for Motor Vehicle Air Conditioners (MVACs)

§608 Proposed Amendments



- Will Further Reduce Ozone-Depleting Refrigerant Emissions
 - Lowers the leak repair trigger rate for commercial refrigeration
 - Requires verification and documentation of all repairs
 - Requires retrofit or retirement of appliances that cannot be sufficiently repaired
 - Mandates replacement of appliance components that have a history of failures
 - Mandates recordkeeping of the determination of the full charge and the fate of recovered refrigerant
- Clarify definitions and regulatory interpretations
 - For example, seasonal variances, leak rate calculation, retrofit, retirement
- Will Streamline Regulatory System
 - Establishes similar requirements for owners/operators of comfort cooling, commercial refrigeration, and industrial process refrigeration appliances

§608 Proposed Amendments



- Are not an exemption to the §608 venting prohibition or other regulatory requirements
- Do not apply to equipment using non-ODS refrigerants (e.g., HFC or "natural refrigerants")
- §608 still only applies to systems with 50+ lbs of ozone-depleting refrigerant (also applies to compact chillers if system has >50 lbs.)



**GREENCHILL'S MISSION:
REDUCE REFRIGERANT
EMISSIONS**

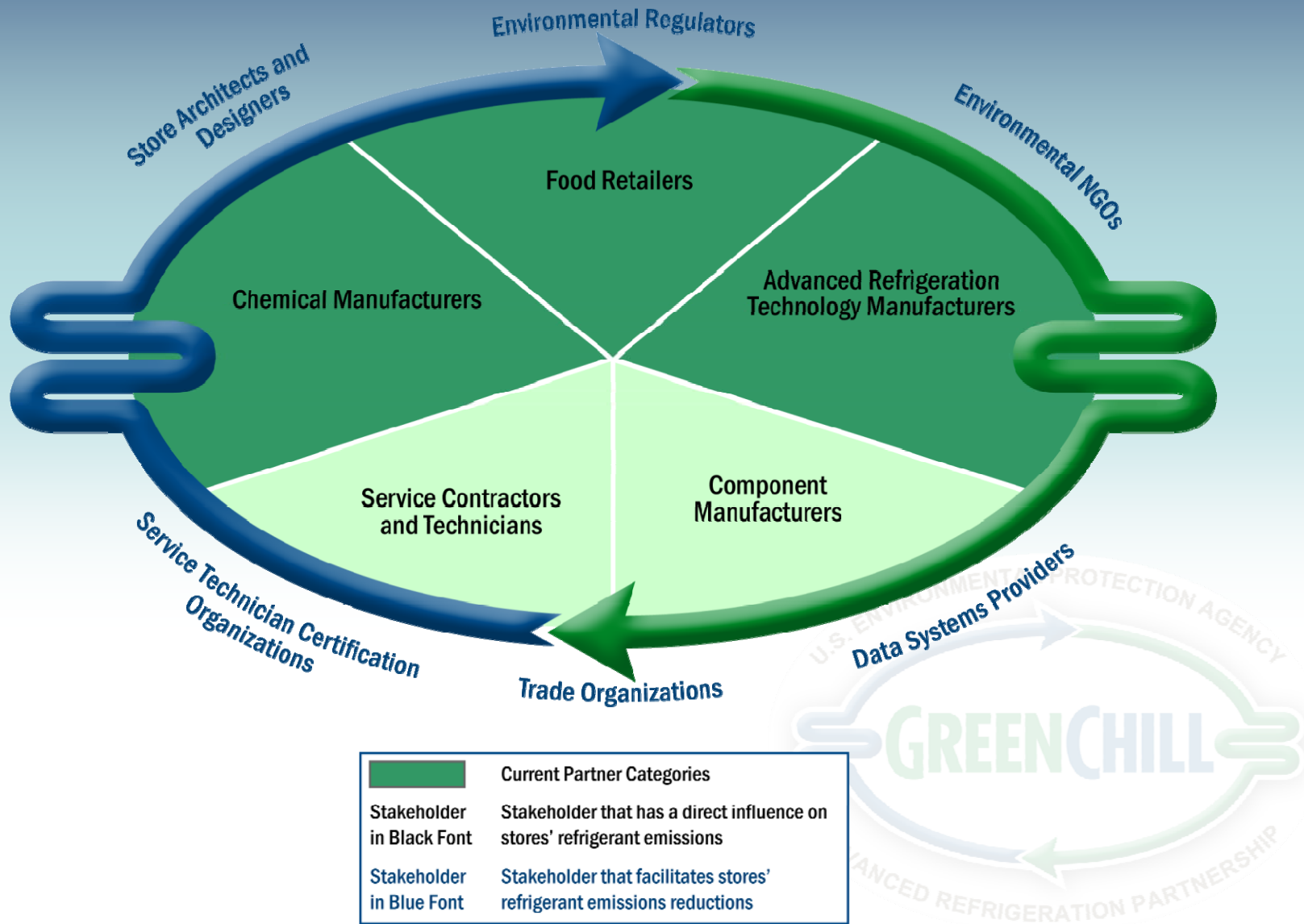


The GreenChill Partnership

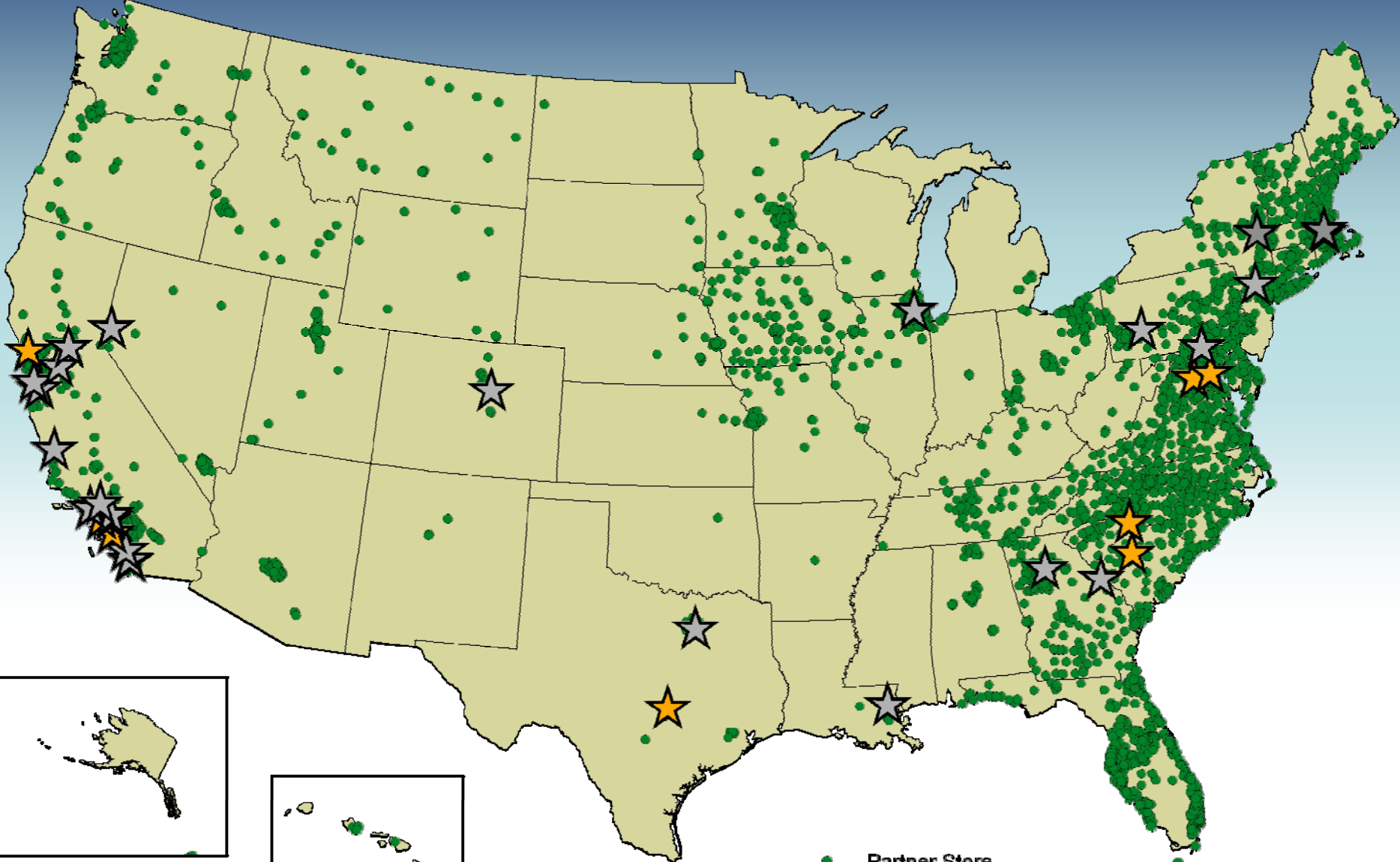
- ▶ Partnership between EPA, supermarkets, and other supermarket industry stakeholders
- ▶ Mission: to reduce refrigerant emissions from supermarkets and decrease the industry's impact on the ozone layer and climate change
 - ▶ Transition to environmentally friendlier refrigerants
 - ▶ Lower refrigerant charge sizes and eliminate refrigerant leaks
 - ▶ Adopt green refrigeration technologies, strategies, and practices
- ▶ www.epa.gov/greenchill



GreenChill Stakeholders



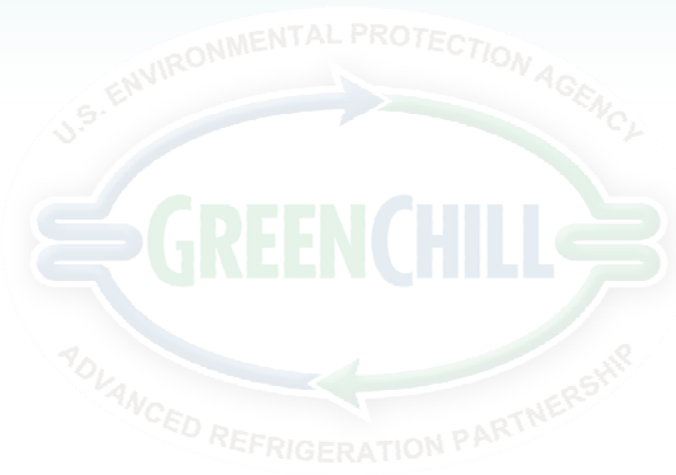
GreenChill Partnership



- Partner Store
- ★ GreenChill-Certified Store



GreenChill Partners
measure emissions and
set annual goals.





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Awards GreenChill certification to
stores for achieving emissions
reduction targets.



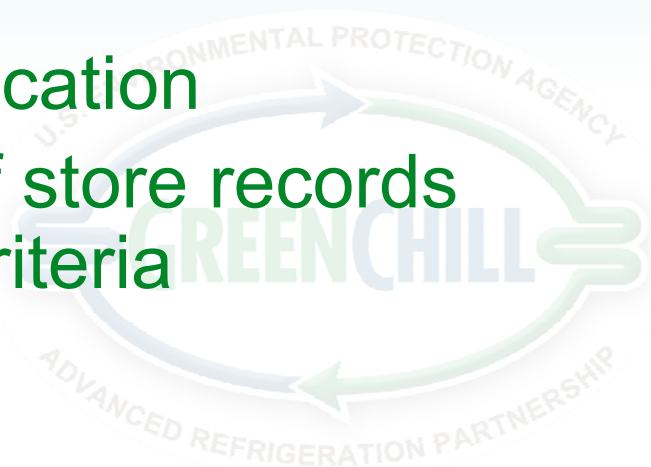
GreenChill's Store Certification Program Overview

- ▶ EPA recognition for green refrigeration
- ▶ Three award levels: platinum, gold & silver
- ▶ Objective criteria for store achievement
 - ▶ Refrigerant charge
 - ▶ Refrigerant leak rate
 - ▶ Type of refrigerants used
 - ▶ Installation leak tightness (newly constructed stores only)
- ▶ Process is easy, fast and free
- ▶ See <http://www.epa.gov/greenchill/certcenter.html> for details and guidance



GreenChill's Store Certification Program Overview

- ▶ May be re-earned annually
 - ▶ “Continued excellence” awards
 - ▶ May lose certification - reapply in 1 yr.
- ▶ GreenChill may verify the information on your application by
 - ▶ inspecting the store
 - ▶ requesting third party certification
 - ▶ and/or requesting copies of store records related to the certification criteria



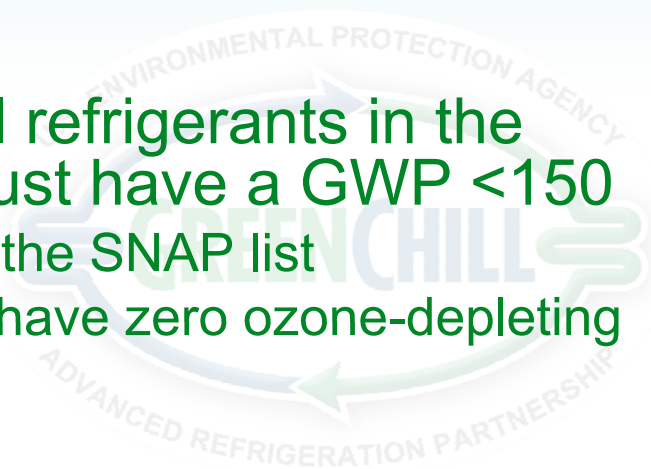
GreenChill's Store Certification Program Overview

- ▶ Do NOT have to be a GreenChill Partner
- ▶ Only for U.S. stores
- ▶ Only for supermarket-type stores
- ▶ Still a lot of “firsts”



Criteria for Platinum – 2 Routes

- ▶ HFC-based refrigeration systems: all refrigerants in the store must have zero ozone-depleting potential. No R-22.
 - ▶ Reduced refrigerant charge
 - ▶ Max 0.5 lbs. of refrigerant per 1000 BTU/hr. total evaporator cooling load
 - ▶ Low leak rate
 - ▶ $\leq 5\%$
 - ▶ If new construction, must follow GC's installation leak tightness guidelines
- ▶ Low GWP refrigeration systems: all refrigerants in the commercial refrigeration system must have a GWP < 150
 - ▶ The low-GWP refrigerants must be on the SNAP list
 - ▶ All other refrigerants in the store must have zero ozone-depleting potential. No R-22.



GreenChill's Store Certification Program Application Process

- ▶ Application forms are on GreenChill's website
 - ▶ Newly constructed stores
 - ▶ Fully operational stores
 - ▶ Recertifying stores
- ▶ Easy: 1 page – front and back
- ▶ Fast: often same day
- ▶ Free: No application fee, no EPA cost, awardee pays for the optional plaque





GreenChill Certification Plaques



Platinum Level Certification



Gold Level Certification



Silver Level Certification

**GREENCHILL'S MISSION:
REDUCE REFRIGERANT
EMISSIONS**

**Corporate Emissions
Reductions Program**

GreenChill Partners
measure emissions and
set annual goals.

**Store Certification
Program**

Awards GreenChill certification to
stores for achieving emissions
reduction targets.

**Advanced
Refrigeration
Program**

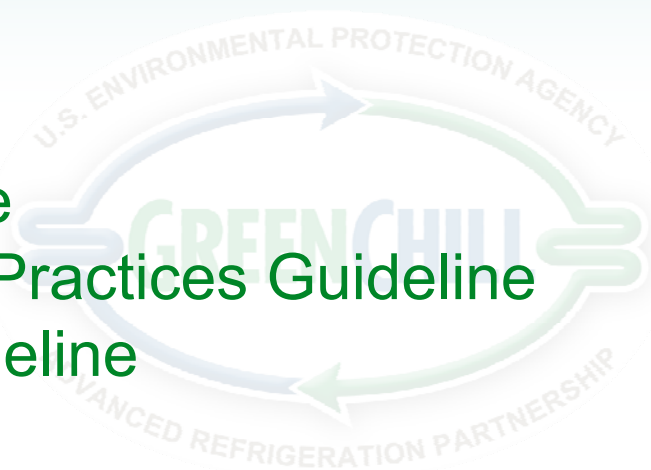
Promotes the use of advanced
refrigeration technologies,
strategies, and practices.

GREENCHILL

U.S. ENVIRONMENTAL PROTECTION AGENCY
ADVANCED REFRIGERATION PARTNERSHIP

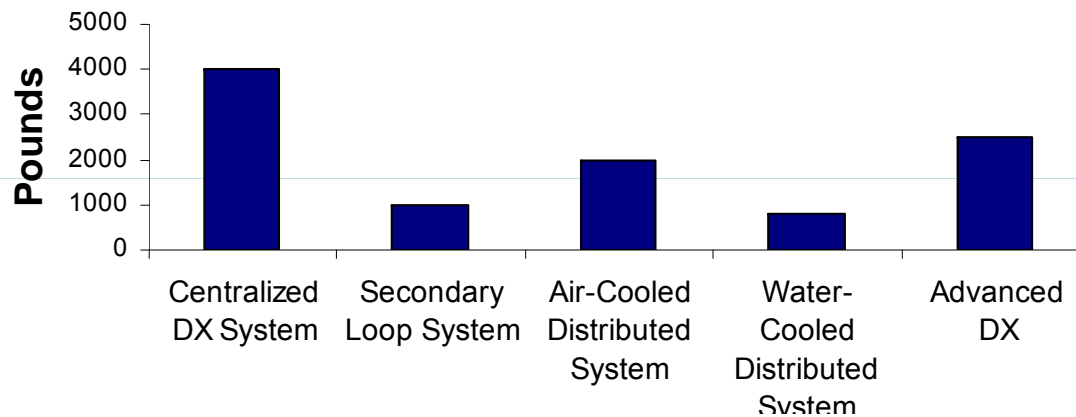
Advanced Refrigeration Program

- ▶ **Advanced Technologies**
 - ▶ Technologies to reduce charge sizes and leaks
 - ▶ Technologies that use low GWP/no ODP refrigerants
- ▶ **Advanced Strategies**
 - ▶ Refrigerant Choice
 - ▶ Prioritize refrigerant management
 - ▶ Measure emissions
 - ▶ Set goals
 - ▶ Refrigerant choice
- ▶ **Advanced Practices**
 - ▶ Retrofit Best Practices Guideline
 - ▶ Leak Prevention & Repair Best Practices Guideline
 - ▶ Installation Leak Tightness Guideline

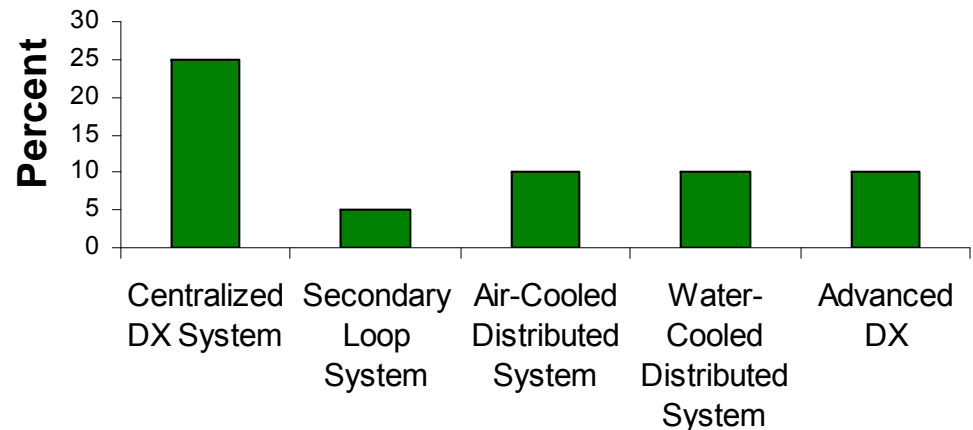


Advanced Refrigeration Technology: smaller charges & fewer leaks

Average Refrigerant Charges



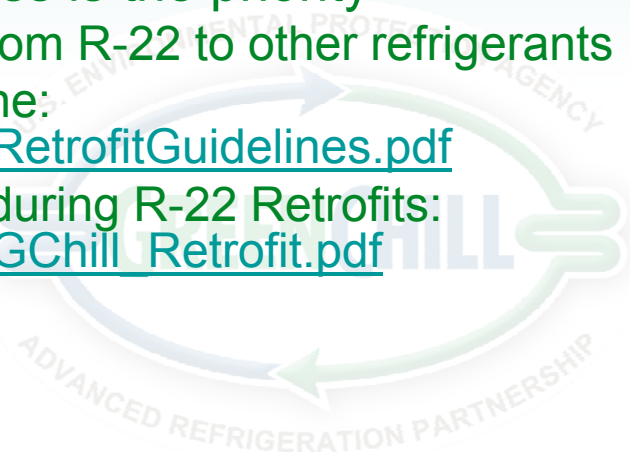
Average Annual Leak Rates



Moving from traditional DX: means tighter systems, fewer emissions

GreenChill and Refrigerant Choice

- ▶ Refrigerant choice impacts the ozone layer & climate change
- ▶ GreenChill Partners have committed to no R-22 use in new construction and remodels (incl. expansions) since 2007
- ▶ Supermarkets are trying to reduce their dependence on R-22 by retrofitting R-22 equipment to use HFCs
- ▶ R-22 retrofits are not an environmental end, in and of themselves
 - ▶ R-22 retrofits are not required by EPA regulations & they are not a GreenChill priority
 - ▶ Regardless of the refrigerant, leak tightness is the priority
 - ▶ Prioritize leak tightness when retrofitting from R-22 to other refrigerants
 - ▶ GreenChill Retrofit Best Practices Guideline: <http://www.epa.gov/greenchill/downloads/RetrofitGuidelines.pdf>
 - ▶ Fact sheet on Prioritizing Leak Tightness during R-22 Retrofits: http://www.epa.gov/greenchill/downloads/GChill_Retrofit.pdf



Commercial Refrigerants where are we headed?

- ▶ Supermarkets have to choose between the many available refrigerants
- ▶ Environmental concerns are increasingly top of mind
- ▶ Two main environmental considerations in 2010 and beyond
 - ▶ R-22 phase-out
 - ▶ Global warming concerns
- ▶ “Natural” Refrigerants – future webinars



GreenChill Best Practices Guideline Commercial Refrigeration Retrofits

- ▶ Mission: provide food retailers with fact-based, neutral information on best practices for every aspect of the HCFC-22 conversion process
- ▶ Retrofit Guideline is at <http://epa.gov/ozone/partnerships/greenchill/downloads/RetrofitGuidelines.pdf>



Leak Prevention & Repairs

- ▶ Coming Soon: *GreenChill Best Practices Guideline – Leak Prevention and Repairs*
- ▶ No cookie-cutter solution for all stores!
- ▶ Supermarket refrigerant leaks
 - ▶ Average supermarket is 20-25%
 - ▶ GreenChill members average 12%
 - ▶ Individual partners average <7% across whole corporation
 - ▶ Advanced systems w/best practices can achieve 0-5%

